COFFEEVILLE PLANT MATERIALS CENTER

Coffeeville, Mississippi

Report of Activities - 1990

United States
Department of
Agriculture

Soil
Conservation
Service

COVER DESIGN BY DEAN FOSTER, SCS, CIVIL ENGINEERING TECHNICIAN

TABLE OF CONTENTS

REPORT OF ACTIVITIES - 1990
COFFEEVILLE PLANT MATERIALS CENTER
COFFEEVILLE, MISSISSIPPI

INTRODUCTION

The Coffeeville Plant Materials Center (PMC) is part of a network of 26 centers operated by the Soil Conservation Service (SCS). The National Plant Materials Program began soon after the SCS was founded because it was recognized that better plants were needed. The purpose of the Plant Materials Program is to select improved plant cultivars and develop better methods for the prevention of soil erosion using plants. When cultivars are shown to be superior, they are released to the public for commercial production. Since the program was started, about 300 varieties of superior plants have been released. Many of these are well adapted to the South. The most outstanding of these is probably 'Pensacola' bahiagrass.

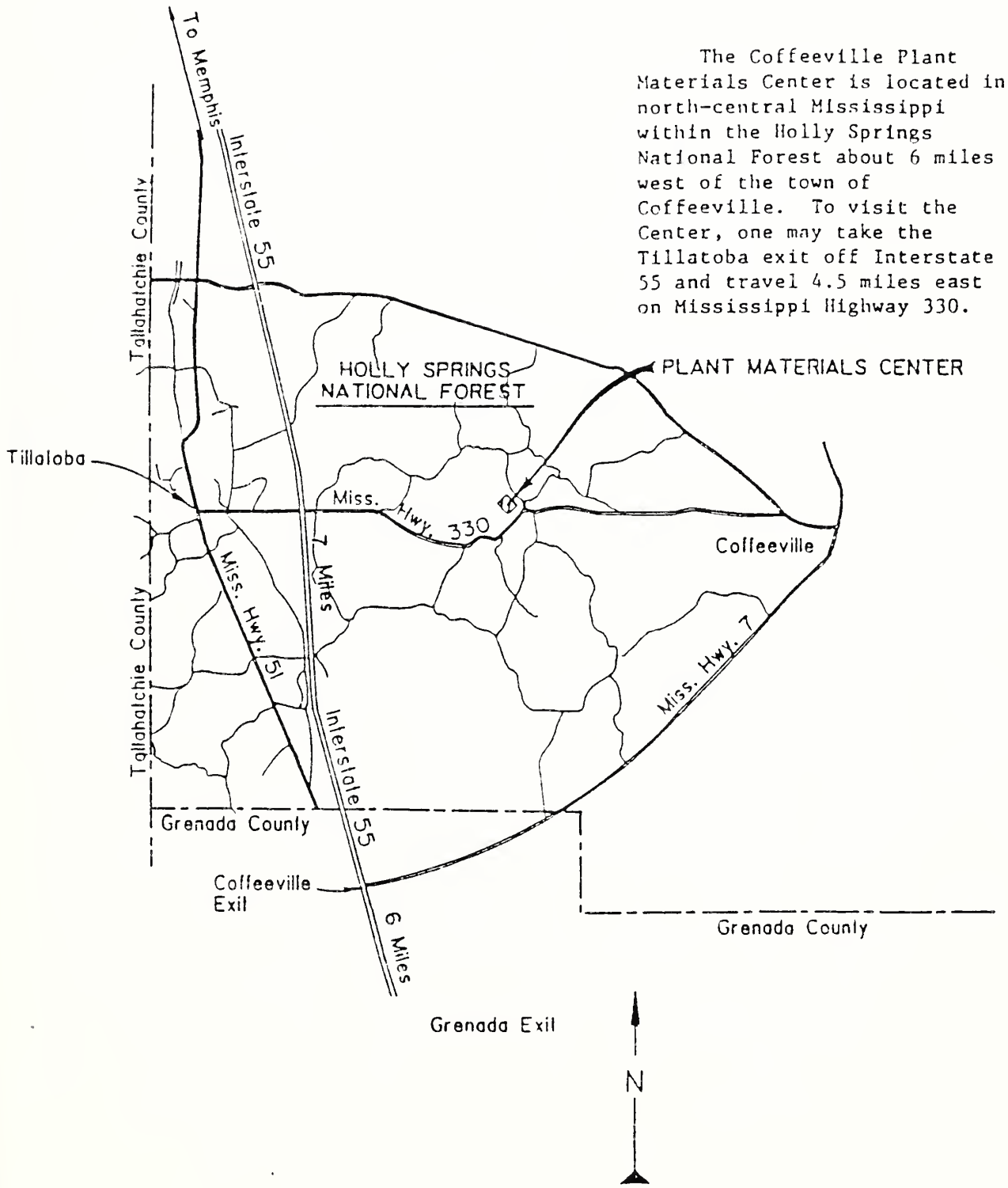
The Coffeeville PMC began as part of the much larger Flood Prevention Seed Unit on August 8, 1960. In 1982, the Seed Unit was discontinued and plant materials activities were reorganized and expanded. Throughout its history, the Coffeeville PMC has evaluated over 6,000 plants. A number of these were determined to be superior conservation plants and were later released, not only by Coffeeville but by other PMCs and experiment stations.

FACILITIES

The Coffeeville PMC is located within the Holly Springs National Forest on state Hwy. 330 between Coffeeville and Tillatoba (Figure 1). About 5 miles east of Interstate 55 is the headquarters area consisting of an office, greenhouse, seed cleaning and warehouse building, and two equipment sheds. In 1990, a program was initiated to upgrade facilities to accommodate recent and rapid advances in biotechnology. The 1,200 sq. ft. office building was expanded to 2,800 square feet with the addition of a laboratory and conference room. Computer capacity was increased so that research information could be accessed from technical databases. Plans were made to replace the temporary buildings that were erected in the 1950's with a modern equipment shed and shop. A modern greenhouse complex with sections for seed technology, tissue culture, and water quality experiments is also being considered. The headquarters area without improvements is shown in Figure 2.

A short distance from the headquarters area are the main PMC fields (Figure 3). Most work is conducted in the nearly level bottom land on Oaklimeter silt loam which is naturally very acid and wet. With drainage and water control, this soil can be very productive. Soils of the slopes are predominantly Loring and Grenada silt loams with fragipans. The combination of bottom land, hillsides, and streams provides a variety of situations for testing many plants for a number of purposes.

The main PMC field consists of 180 acres and may be irrigated from two ponds. An option to use two other fields within the National Forest gives the PMC the potential to expand its operation to 360 acres. In 1990 the center responded



The Coffeeville Plant Materials Center is located in north-central Mississippi within the Holly Springs National Forest about 6 miles west of the town of Coffeeville. To visit the Center, one may take the Tillatoba exit off Interstate 55 and travel 4.5 miles east on Mississippi Highway 330.

Figure 1. Map showing location of Coffeeville Plant Materials Center within Holly Springs National Forest.

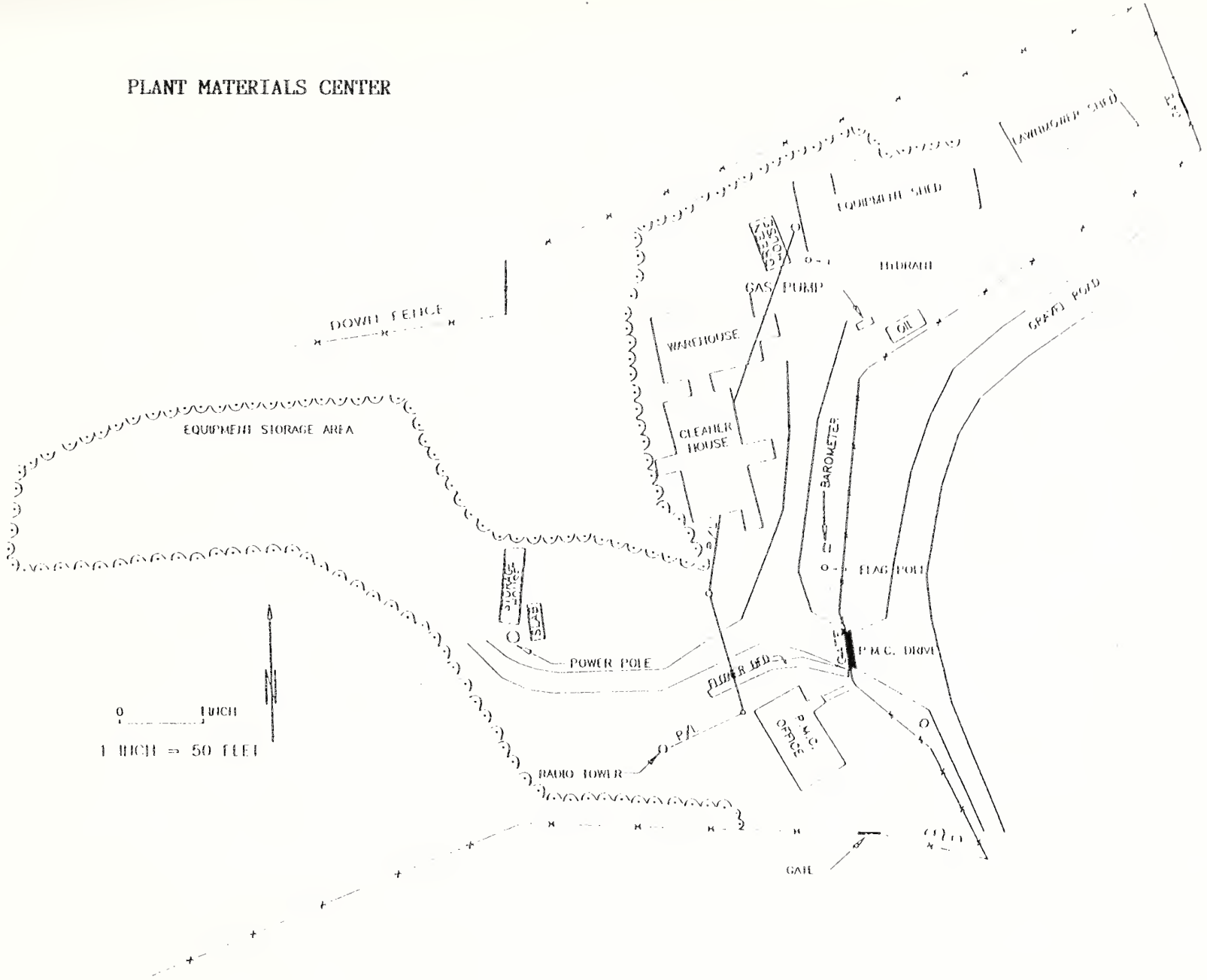


Figure 2. Headquarters area, Coffeeville Plant Materials Center, at beginning of 1990 before new structures were added.

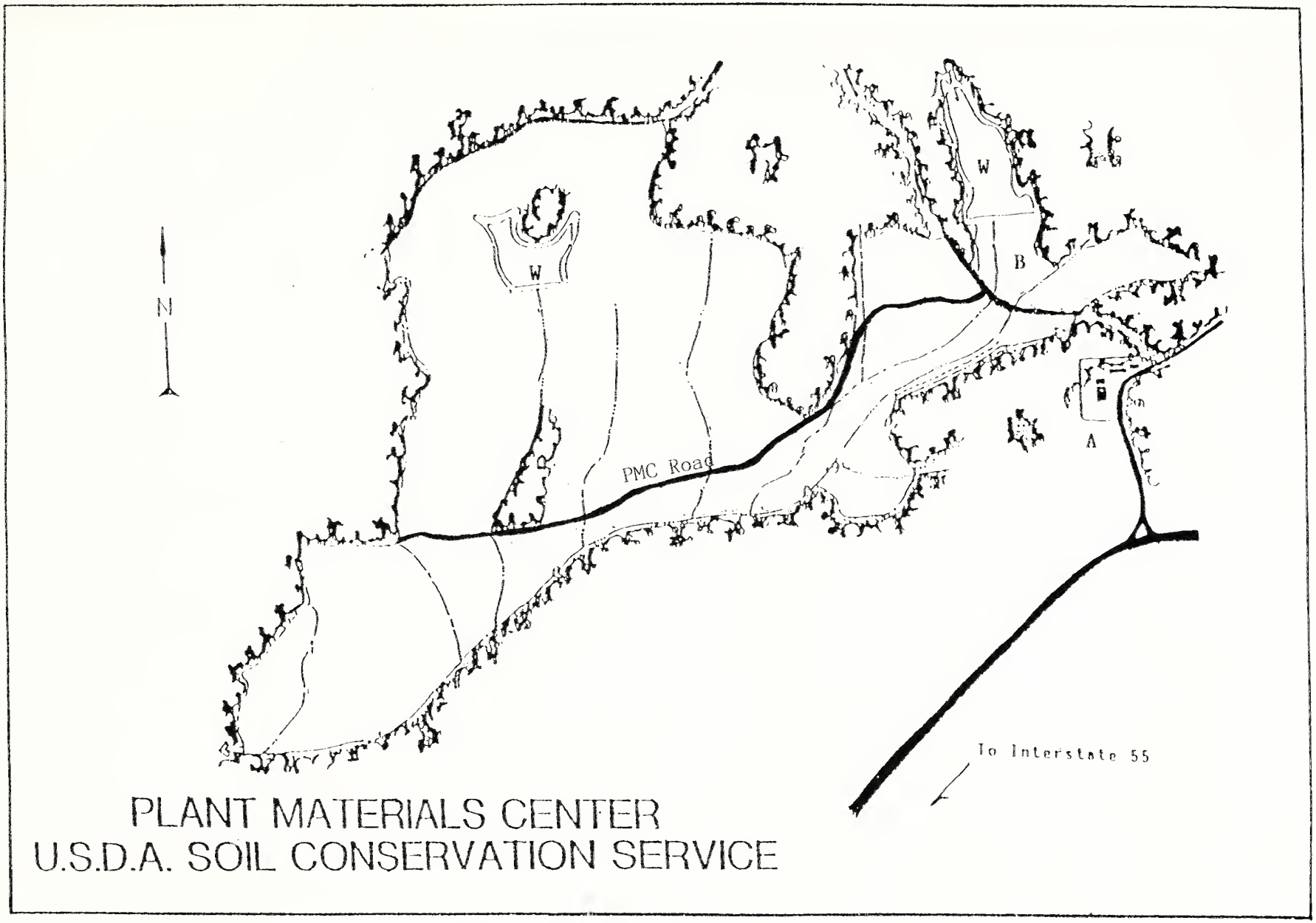


Figure 3. Outline of Plant Materials Center fields showing location of headquarters area (A), wetland cells (B), ponds (W), streams, and main PMC road. Most of evaluations are conducted on nearly level bottomland south of main road.

to increased interest in plants for improvement of water quality by constructing 24 wetland cells, each 15 X 60 feet, to test and produce aquatic plants (Figure 4).

WEATHER

Following a very cold December in 1989, temperatures were mild for January into March of 1990. Many early flowering plants broke dormancy, and the flowers were subsequently killed by freezes in March or April. The last freeze of the season came on April 7, and freezing temperatures did not return until October 27. A growing season of 204 freeze-free days is somewhat misleading because many warm season plants were not killed and warm weather continued for another month.

Rainfall for 1990 was 69.62 inches, about 15 inches more than the long-term average. The wettest month was December with 13.76 inches. A drought from late July into September adversely affected many plants. Only 0.66 inches of rain fell in August. Data for 1990 are shown in Table 1.

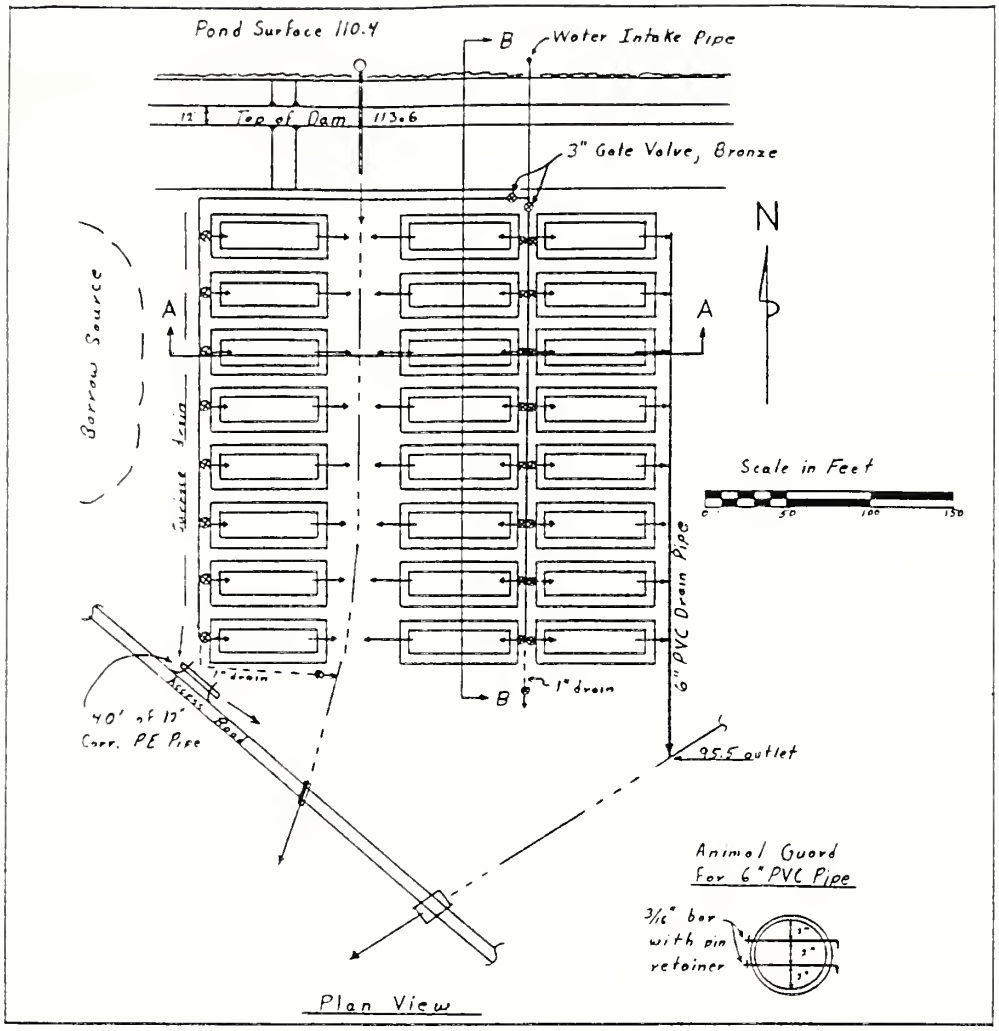
SERVICE AREA

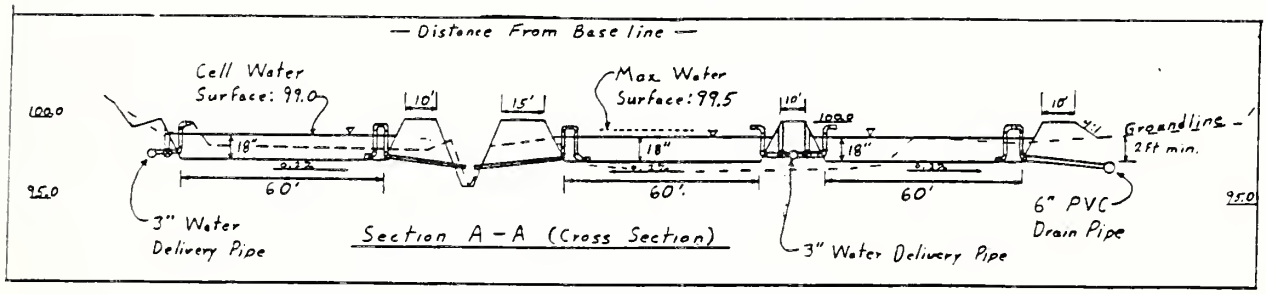
The primary service area for the Coffeeville PMC includes most of Mississippi and significant areas of Alabama, Arkansas, Louisiana, and Tennessee (Figure 5). Throughout the service area, the climate is humid and temperate. Rainfall is approximately 50 inches for most of the area. Droughts in late summer and autumn are common. Temperature increases from north to south. Summer temperatures of 90°F to over 100°F are commonly accompanied by high humidity. Winters are mild in the southern part. Snowfall accumulations are common only in the north. Soil, vegetation, topography, and land usage are closely related to the major land resource area (MLRA).

LONG RANGE PROGRAM

Conservation problems for the PMC service area are identified in the PMC Long Range Program. Once the priorities have been established by the State Conservationists' Advisory Committee, the PMC develops project plans to solve the problems given the highest priority. Priorities for the major conservation problems in the Coffeeville PMC service area are as follows:

CONSERVATION PROBLEM	PRIORITY
CROPLAND EROSION	HIGH
PASTURE AND RANGELAND EROSION	MEDIUM
WOODLAND EROSION	MEDIUM
CRITICAL AREA EROSION	MEDIUM
WATER QUALITY DETERIORATION	HIGH





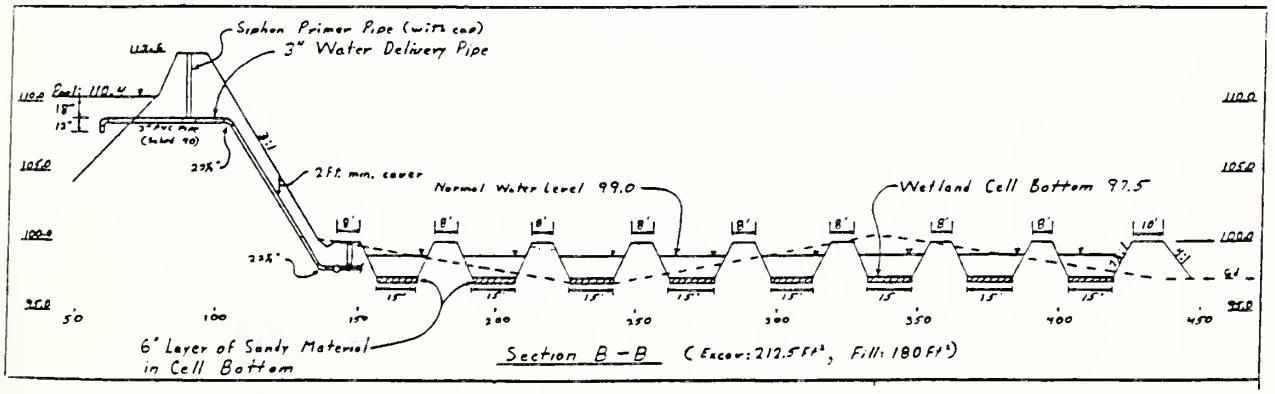


Figure 4. Diagrams of wetland cells constructed in 1990.

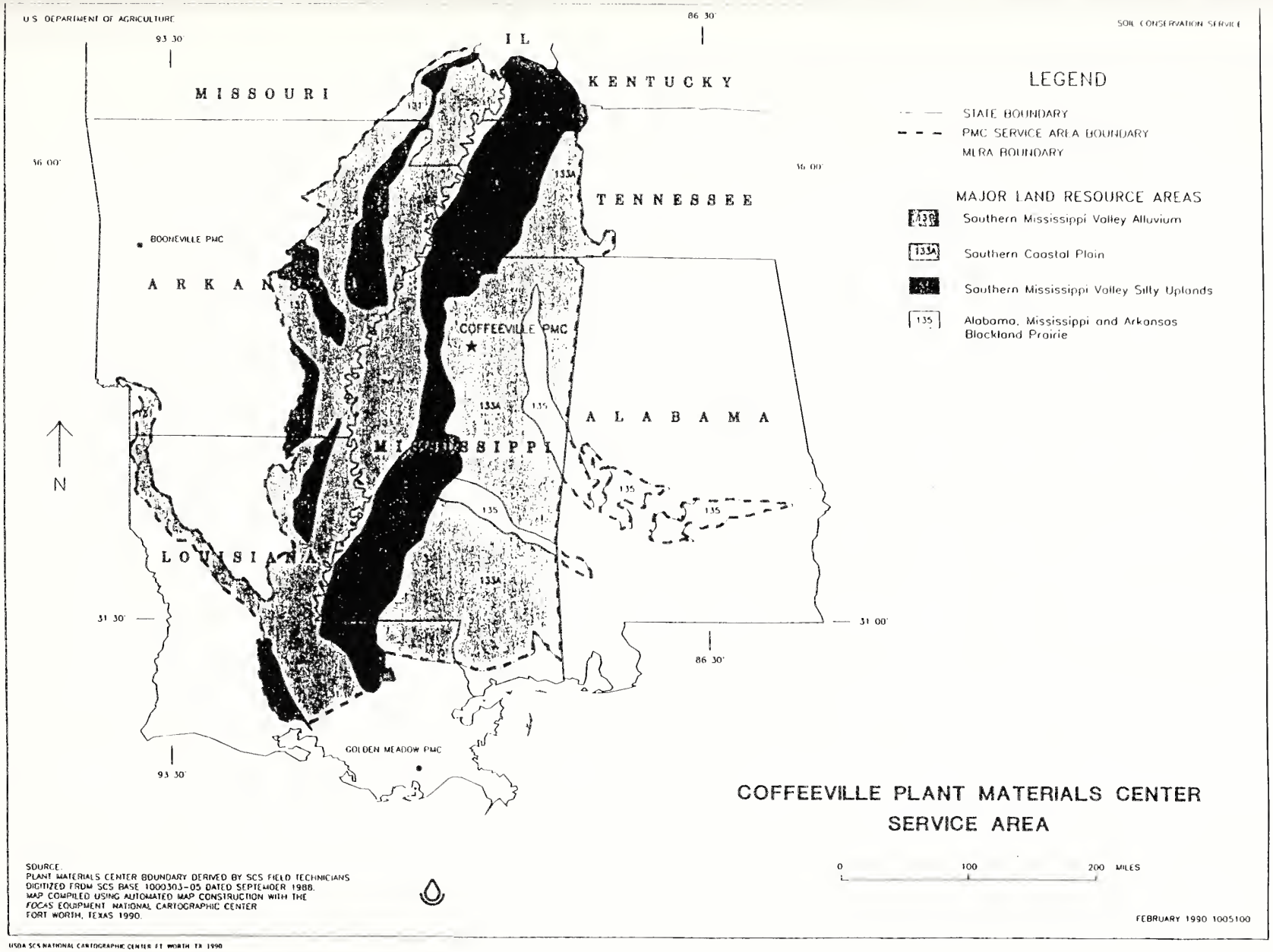


Figure 5. Service area for Coffeeville Plant Materials Center.

Table 1. Weather summary for 1990 at Coffeeville Plant Materials Center.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (°F)														
Extreme 1990	High	73	77	79	85	86	95	97	102	102	91	84	72	102
	Low	18	28	27	27	40	55	56	56	42	30	24	13	13
Average 1990	High	57	64	66	72	78	88	90	92	90	76	71	59	75
	Low	35	39	43	46	55	66	68	67	63	47	43	40	51
Average 1975-1990	High	46	52	62	71	78	87	91	89	84	71	61	50	70.2
	Low	29	35	43	50	60	68	73	72	64	50	42	34	51.6
Precipitation (in.)														
Total 1990		6.16	10.13	7.43	5.65	5.43	2.73	4.22	.66	2.66	4.87	5.92	13.76	69.62
Average 1975-1990		4.43	4.89	6.27	4.98	6.22	4.91	4.44	3.05	4.36	4.12	6.71	5.69	60.08

First Freeze: 10/27/90 - 30°
Last Freeze: 04/07/90 - 27°
Growing Season: 204 days

MAJOR PROJECTS IN 1990

Problems in the PMC Long Range Program are too complex to solve in one simple operation so they are broken into a set of simpler components. Then the PMC Manager, in consultation with appropriate technical specialists, develops project plans designed to solve one segment of the problem. Projects are designed (1) to develop improved methods to use plant materials, or (2) to select and release improved cultivars for conservation purposes.

PROJECTS TO DEVELOP IMPROVED METHODS

The investigation of new methods to use conservation plants has been a part of the Coffeeville PMC operation throughout much of its history. In response to the Food Security Act of 1985, the PMC placed increased emphasis on developing better methods to solve erosion problems using plants. Much of this work involved developing no-till systems for common row crops, especially cotton.

Cover Crops for Cotton

In 1990, replicated trials were conducted to evaluate (1) establishment methods for cover crops in no-till cotton and (2) the effects of cover crops and tillage on cotton.

For the establishment study, no-till (NT), disking once (1X), chiseling (1X), and paraplow plowing were evaluated for establishing wheat, rye, crimson clover, and hairy vetch in NT cotton. Due to delayed planting and low temperatures, growth of the legumes was severely reduced. Wheat and rye, though damaged by the weather, remained hardy. Canopy cover by hairy vetch and the grasses was not significantly different on March 30, but the vetch provided more cover by April 13 (Table 2). However, wheat and rye produced higher dry matter (DM) yields. Disking (1X) tended to decrease canopy cover and DM yield but no significant differences were found (Table 3). Cotton following rye showed nitrogen deficiency symptoms (stunted growth and yellow leaves) during August and produced a significantly lower yield (Table 4). No differences were shown for cover crop establishment methods on NT seedcotton yield. The data suggest that tillage is not necessary to establish a cover crop in NT cotton.

In the second study, canopy cover was equal on March 30 for crimson clover, hairy vetch, wheat, and native cool season weeds (Table 5). On April 13, hairy vetch provided more cover than crimson clover or native weeds but not more than wheat. Crimson clover growth was reduced by delayed planting and low temperatures and produced a lower percent cover on April 13 than native weeds. Wheat produced the highest DM yield.

Seedcotton yield was not affected by cover crop or tillage system in 1990 (Table 6). Plant growth and development was comparable for cotton with all cover crop and tillage systems during the year. However, cotton following wheat showed some signs of nitrogen deficiency in August.

Table 2. Canopy cover (%) by dates and dry matter yield (lb/A) of cover crops at Coffeeville, Mississippi (1990).

Cover Crop	Canopy Cover 3/30	Canopy Cover 4/13	Dry Matter 4/13
Crimson clover	15b*	22c	108c
Hairy vetch	46a	86a	626b
Rye	40a	63b	1718a
Wheat	39a	60b	1558a

* Column means not followed by a common letter are significantly different as determined by Duncan's Multiple Range Test (DMRT, $p \leq 0.05$).

Table 3. Canopy cover (%) by dates and dry matter yield (lb/A) of cover crops by establishment method at Coffeeville, MS (1990).

Establishment Method	Canopy Cover 3/30	Canopy Cover 4/13	Dry Matter 4/13
No-Till	31*	56	1244
Paratill	44	67	1043
Disk 1X	25	52	804
Chisel 1X	39	60	919

* Column means not followed by a common letter are significantly different as determined by DMRT ($p \leq 0.05$).

Table 4. Seedcotton yield (lb/A) as affected by cover crop and establishment methods at Coffeeville, MS (1990).

Treatment	Seedcotton Yield
Cover crop	
Crimson clover	2052ab#
Hairy vetch	2260a
Rye	1872b
Wheat	2076ab
Establishment method	
No-Till	1878*
Paratill	2032
Disk 1X	2029
Chisel 1X	2322

#,* Column means not followed by a common letter are significantly different as determined by DMRT ($p \leq 0.05$).

Table 5. Canopy cover (%) by dates and dry matter yield (lb/A) of cover crops at Coffeeville, MS (1990).

Cover Crop	Canopy Cover 3/30	Canopy Cover 4/13	DM Yield 4/13
Crimson clover	23	28	150
Hairy vetch	47	85	917
Wheat	52	77	1961
Native	48	59	374
LSD (0.05)	NS	20	485

LSD = Least Significant Difference ($p \leq 0.05$).

Table 6. Seedcotton yield (lb/A) and plant height (inches) as influenced by cover crop and tillage systems at Coffeeville, MS (1990).

Cover Crop	Seedcotton Yield NT	Seedcotton Yield CT	Seedcotton Yield Ave.	Plant Height NT	Plant Height CT	Plant Height Ave.
Crimson Clover	2736	2797	2766	42	38	40
Hairy Vetch	3002	3042	3022	42	44	43
Wheat	2716	2777	2746	36	41	38
Native	2287	2695	2491	36	35	36
Average	2685	2828	2756	39	39	39

NT = No-till; CT = Conventional tillage.

Herbicide Trials for Selected Plants

Many kinds of plants are grown and tested at the PMC, and often little or no information is available concerning their response to herbicides. This information is needed for weed control in PMC projects and to provide information to growers if the plant is later released for public use. In 1990, a series of herbicide trials was initiated to test the effect of some common herbicides on selected plants. Some plants as 'Chiwapa' Japanese millet had already been released but additional information was desirable. Others were potential release candidates at the PMC (to be discussed later). In one test, herbicides were incorporated into the soil before or at planting. In the other, postemergence herbicides were sprayed onto the selected plants. Damage to the plants was rated at 14 and 28 days following treatment. Injury by soil applied herbicides and postemergence herbicides is given in Tables 7 and 8, respectively.

Table 7. Injury to plant accessions by soil applied herbicides (1990).

Plant Materials	14 Days After Treatment					28 Days After Treatment				
	ATR	FLM	MET	TRI	CHK	ATR	FLM	MET	TRI	CHK
Bahiagrass	0c*	0c	9a	7b	0c	7ab	5b	9a	8ab	0c
Herbaceous Mimosa	9a	9a	6a	0b	0b	9a	9a	9a	0b	0b
Japanese Millet	8a	8a	9a	9a	0b	8a	8a	9a	9a	0b
Partridgepea	9a	9a	0b	0b	0b	9a	9a	0b	0b	0b
Purpletop	9a	5b	9a	9a	0c	9a	3b	9a	9a	0c
Sericea Lespedeza	9a	9a	8a	3b	0c	9a	9a	6b	6b	0c

Rating scale: 0 = no injury, 9 = Complete kill.
Herbicide treatments: ATR = atrazine, FLM = fluometuron, MET = metolachlor, TRI = trifluralin, CHK = check.
* Row means within dates not followed by a common letter are significantly different as determined by DMRT ($p \leq 0.05$).

Table 8. Injury to plant accessions by postemergence herbicides (1990).

Plant Materials	ACI	BEN	CHL	CYA	FLZ	IMA	CHK
	---------- 14 Days After Treatment ----------						
Bahiagrass	1c	0c	1c	5b	9a	0c	0c
Herbaceous Mimosa	1a	0a	0a	1a	0a	0a	0a
Japanese Millet	3b	0c	0c	2bc	7a	4b	0c
Partridgepea	8a	0d	1c	8a	0d	2b	0d
Purpletop	2b	0c	0c	8a	9a	1bc	0c
Sericea Lespedeza	0a	0a	0a	0a	0a	0a	0a
	---------- 28 Days After Treatment ----------						
Bahiagrass	2bc	0c	0c	4b	9a	1bc	0c
Herbaceous Mimosa	0a	0a	0a	0a	0a	0a	0a
Japanese Millet	4bc	0c	0c	1bc	8a	1c	0c
Partridgepea	8a	0b	1b	8a	0b	1b	0b
Purpletop	NR	NR	NR	NR	NR	NR	NR
Sericea Lespedeza	0a	0a	0a	0a	0a	0a	0a

Rating scale: 0 = no injury, 9 = Complete kill, NR = not rated.
Herbicide treatments: ACI = aciflurofen, BEN = bentazon, CHL = chlorimuron, CYA = cynazine, FLZ = fluazifop, IMA = imazaquin, CHK = check.
* Row means within dates not followed by a common letter are significantly different as determined by DMRT (p 0.05).

PROJECTS FOR RELEASE OF IMPROVED CULTIVARS

From start to finish, the release of an improved cultivar requires about 15 years of testing. The process is usually divided into a series of seven basic steps that are designed to determine the adaptiveness and performance of the plants and to ensure an adequate supply of materials.

Step 1: Assembly

After a project plan is developed and approved by the State Conservationists' Advisory Committee, the PMC starts to collect seeds or plants from many situations to compare at the PMC. Plant collections may come from a variety of sources, both foreign and native. At the PMC, each collection is given a unique accession number for identification throughout the testing program.

A large number of accessions is usually required to ensure that superior plants will be present. An assembly of more than 35 collections is called a major assembly. Many major assemblies have more than 100 collections.

In 1988, a schedule to initiate assemblies was developed to distribute the workload evenly over a number of years. The schedule was approved by the State Conservationists' Advisory Committee subject to annual review, as are all PMC activities. The schedule for assembly is as follows:

1988	Winter rye (*Secale cereale*) for cover crop.
1988	Dwarf wheat (*Triticum aestivum*) for no-till.
1989	Annual bluegrass (*Poa annua*) for no-till cotton.
1989	Rescuegrass (*Bromus unioloides*) for winter cover.
1990	Sour clover (*Melilotus indica*) for winter cover.
1990	Mustard (*Cruciferae*) for winter cover.
1990	Eastern gamagrass (*Tripsacum dactyloides*) for forage.
1991	Henbit (*Lamium amplexicaule*) for no-till.
1991	Chickweed (*Caryophyllaceae*) for no-till.
1991	Wild geranium (*Geranium* spp.) for no-till.
1991	Wood-sorrel (*Oxalis* spp.) for no-till.
1992	Low panicums (*Dicanthelium* spp.) for critical areas.
1993	Vasey grass (*Paspalum urvillei*) for warm-season forage.

All species to be assembled through 1990 have been collected. The number of field collections of sweet clover and wild mustards was inadequate, and more accessions are to be requested from USDA Plant Introduction (PI) Stations in 1991.

Step 2: Initial Evaluation

After the seeds or plants arrive at the PMC and are given an accession number, they are planted in rows or small plots. Accessions in each assembly are planted in groups so an easier and more meaningful comparison can be made. Periodically, PMC personnel evaluate the plants for vigor; seed production, resistance to diseases and insects; and tolerance to heat, drought, and cold. Also, the plants are measured and dates of flowering and maturity recorded. At the end of this step, a few of the best accessions are selected for more rigorous testing in advanced evaluations.

New Plantings Initiated in 1990

In 1990, initial evaluation was begun for assemblies of 100 accessions of winter rye (Secale cereale) and wheat (Triticum aestivum) that had been obtained from the National Small Grain Laboratory. The objective was to select a short cultivar that would not interfere with no-till planting of soybean or cotton. The two species were planted on September 27, 1990, and no selections have yet been made.

Accessions of eastern gamagrass (Tripsacum dactyloides) that were collected in 1989 were established in a holding block at the PMC in 1990 while other collections were being made. When the assembly is complete with other ecotypes covering the southeastern United States, vegetative material of the accessions will be used to begin the initial evaluation. Observations in 1990 showed differences for individual plants within an accession to be slight while the accessions did show distinct differences.

Some Disappointments in 1990

Bahiagrass (Paspalum notatum), cold-tolerant, for improved pasture.

'Pensacola' bahiagrass is one of the major conservation plants used in the southeast. Commercial sales of it was greater than for any other SCS plant materials release in 1989. Although more cold tolerant than the bahiagrass originally introduced into the United States, Pensacola is often killed or damaged by freezing in the northern part of the PMC service area. 'Wilmington', released by the Coffeeville PMC in 1971, tolerates colder temperatures, but it is such a poor seed producer that commercial production is not profitable.

Seeds and plants of scattered stands of bahiagrass were collected from the northern part of its range in hopes of locating a more cold tolerant, locally adapted ecotype. These were planted at the Coffeeville PMC in 1987. Because a more cold tolerant warm season grass was desired for the Ozark region of Arkansas, vegetative material of each accession was moved to the Booneville PMC to subject it to colder winters.

Bahiagrass grew well at both PMCs until unusually cold weather of -3°F at the Coffeeville PMC on December 21, 22, 23, 1989, gave the accessions a severe test. All plants at Booneville were destroyed, and those at Coffeeville were severely damaged. None appeared to be more cold tolerant than Pensacola, and none survived the winter as well as Wilmington.

Vetiver grass (Vetiveria zizanioides) for soil and water protection.

The same cold spell that played havoc with bahiagrass toppled "Vetiver the Great." Probably no plant in modern times had been extolled for soil and moisture conservation more. Vetiver was described as the "ideal plant." Proponents stated, "Although many grasses and trees have been tried over the years as measures to prevent erosion, to date only vetiver grass has stood the test of time." As vegetative hedges, vetiver can be used to replace constructed terraces as well as be used to plug gullies, protect roadsides and bridges, stabilize stream banks and shorelines, and conserve soil moisture. Proponents also said that it is easy to establish, it will not spread or become a pest, and it may even be used to control weeds. It forms such a

dense mat of roots that rhizomes of bermudagrass cannot penetrate a hedge of it. Its aromatic roots will repel snakes, rodents, and other pests. The plant is both a hydrophyte and a xerophyte. It will grow in all types of soil regardless of fertility, pH, or salinity. Even "when all surrounding plants have been destroyed by drought, flood, pest, disease, fire or other adversity, the vetiver will remain to protect the ground from the onslaught of the next rains." It is even suspected that its roots are associated with nitrogen-fixing mycorrhiza. In its native India and elsewhere, it is also used for mats, baskets, roofing, and perfume.

With features like these, it is now hard to understand why the value of vetiver grass had not been recognized earlier in the United States. After all, it had been growing in this country since the 19th century when it was introduced into Louisiana for making perfume. The perfume industry did not prosper, but many of the plants persisted.

When the acclaims of vetiver reached the United States, everybody seemed to want into the act. Government agencies, state universities, and others got together on August 14-15, 1989, at Griffin, GA, to plot strategy. The "galloping horseman approach" was decided upon and project GHOST (Grass Hedges for Erosion Control) was initiated. Vetiver was to be studied simultaneously at many plant materials centers, research stations, and field locations. The Coffeeville PMC, which had already obtained approximately 2,000 slips of vetiver grass from Sunshine, LA, was to play a key role in supplying vetiver for the project. This procurement was given accession number 9054943 and was planted in March 1989. Other accessions (PI-196257, PI-213903, PI-271633, PI-302300) were available from the S-9 Regional PI Station in Griffin, Georgia. All of the accessions looked good throughout the summer and received considerable attention. Plans were developed to test the grass with a large amount of the work being done at the Coffeeville PMC with two objectives:

1) Release of a cultivar if one accession should appear superior.
2) Learning more about the grass in PMC and field trials.

Guidelines were drawn up for uniform evaluation of the plants at various locations involving the SCS, Agricultural Research Service, state universities, and others. Many plants of the Sunshine accession were to be distributed by Plant Materials Specialists in Georgia and Mississippi for field trials to test its effectiveness in controlling erosion on terraces, stream banks, gullies, and other situations. The "galloping horsemen" were set to move. Farmers and other who saw and heard about this miracle plant were eager to receive some.

Then like mighty Achilles, "Vetiver the Great" was found to have a weak point, winter injury. The damage had come in December, but no one was certain how severe it was. When spring came, all plants looked dead including the Sunshine accession which by then had multiplied to over 20,000 slips. Finally 5 of 35 plants of PI-196257 showed signs of life, but they were weak and slow to appear. Then seedlings began to sprout around the old stubble. Seeds collected from three accessions obtained from the PI Station also germinated in the greenhouse (the Sunshine accession never produced any seeds and had been favored because it would pose no weed problem). Another accession, PI-537061 collected in India and released from quarantine in 1990 and was added to the group.

In November of 1990, another workshop was held in Beltsville, MD, to discuss the fate of project GHOST. The outlook for vetiver was not as optimistic as in the preceding year. Reports of success and failure were mixed. Vetiver the Great had survived an attack to its Achilles heel, but it was only a ghost of its former self. Vetiver planted in 1990 at Ft. Polk, LA, had performed well in the summer, but it had not lived through one winter in the field. Perhaps it was far enough south to survive a normal winter in the "Deep South." Vetiver is native and naturalized to a wide area. Perhaps a more cold tolerant accession could be located. Other grasses, although not a "Vetiver the Great," may be used as vegetative hedges. The concept of grass hedges appeared sound. Work will continue along these lines. Vetiver the Great had fallen, but Vetiver the Great was not dead.

Selections Made in 1990

Initial evaluations were completed for five species in 1990, and superior accessions were selected to increase in 1991 for advanced testing later.

Rescuegrass (*Bromus unioloides*) for winter cover with row crops.

Rescuegrass was evaluated in four randomly replicated blocks in 1989. Of the 110 accessions, only four performed well in all replications. Two accessions, obtained through the PI Station, were of foreign origin, and two were collections naturalized to the United States. The two from foreign sources scored best in the evaluations, but seeds matured too late to be used with no-till crops. However, they showed good potential for winter pasture. The four accessions were:

250648 from Pakistan through West PI Station.
442079 from Japan through West PI Station.
9054984 collected in Stephens County, OK, by Kurt Owens.
9054989 collected in Wilson County, TX, by Astor Boozer.

Crownvetch (*Coronilla varia*), heat-tolerant, for critical area stabilization.

9028585 collected as composite from old stand at Coffeeville PMC.

Lespedezas (*Lespedeza virginica*), upright natives, for erosion control in forests and field borders.

9021710 collected in Hinds County, MS, by James Wolfe.
9045268 collected in Marion County, AR, by Kenneth Croft.
9045294 collected in Crawford County, AR, by Tom Gentry.
9045296 collected in Copiah County, MS, by Bennie Hutchins.

Herbaceous mimosa (*Mimosa strigillosa*) for cropland erosion control and critical area stabilization.

9045323 collected in Concordia Parish, LA, by Wayne Magoun.
9045334 collected in St. John the Baptist Parish, LA, by Davis & Phillips.
9045353 collected in Avoyelles Parish, LA, By Keith Lehto.

Trailing wild bean (Strophostyles helvola) for erosion control in forests and field borders.

9008290 from Colorado County, TX, through Knox City (TX) PMC.
9017146 obtained through National PMC at Beltsville, MD.
9021718 collected in Washington County, MS, by Clyde Hamberlin.
9021719 collected in Crittenden County, AR, by J. L. Reid.
9028588 collected in Yalobusha County, MS, by Joe Snider.

Step 3: Initial or Small Scale Increase

When an initial evaluation has been completed and accessions with superior qualities have been selected, they are increased in small plots to provide material for additional testing. Species and accessions in initial increase in 1990 were:

Partridgepea (Cassia fasciculata) for critical areas and field borders.

9021655 collected in Crawford County, AR, by Wayne Weege.
9021660 collected in Columbia County, AR, by B. J. Cook.
9028375 collected in Lee County, AR., by Villines.

Beaked panicgrass (Panicum anceps) for critical area erosion control and rangeland improvement.

9002928 collected in Virginia and received from the Quicksand PMC.
9028349 collected in Jefferson County, Arkansas, by A. G. Mendenhall.
9028510 collected in Wayne County, Mississippi, by James A. Wolfe.

Purpletop (Tridens flavus) for critical area stabilization and rangeland improvement.

9002937 an experimental line from the Quicksand (KY) PMC.
9041780 another experimental line from the Quicksand (KY) PMC.
9028270 collected in Yell County, Arkansas, by C. G. Fleischman.

Step 4: Advanced Testing

When sufficient material has been increased, the accessions selected as superior in initial evaluations are tested for ability to solve one or more conservation problems in the PMC Long Range Program. The selected accessions are compared with standard plants that are currently considered the best to solve the problem.

Advanced testing often includes off-center plantings to test plants where soil or other conditions strongly contrast with those at the center. These are conducted as a part of the PMC program or in conjunction with other plant materials activities.

Giant Reed (Arundo donax) for critical area stabilization.

In 1990, an advanced evaluation project was concluded in which one accession, PI-432432, already considered to be the best at the Coffeeville PMC, was compared to five superior selections from the Brooksville (FL) PMC. The Coffeeville selection was shown to be as good or better than the others. Selection of PI-432432 for release will depend on how it compares to the others across the southeastern states. The demand for this species does not currently appear to warrant production of more than one cultivar release.

Step 5: Field or Large Scale Increase

Accessions that are candidates for release are grown in large quantities for the final stages of evaluation. Some of the material continues to be used in advanced evaluations but much is destined for field plantings.

Step 6: Field Plantings

The last step in evaluating a candidate for release by a PMC is the field planting. In field plantings, the test plant is compared to standards (best plants currently available for that purpose) in actual field situations. At this point, the test plants are still in the experimental stage and are not to be harvested and sold before they are formally released.

Candidates for release at the Coffeeville PMC being tested in field plantings in 1990 were:

Afghan reedgrass (Calamagrostis pseudophragmites, PI-220584)
Goat willow (Salix caprea, PI-434284)
Gilg willow (Salix gilgiana, 9004882)
Erect willow (Salix rigida, 9004885)
Prairie willow (Salix humilis, 9004886)

Step 7: Cultivar Release and Use

When data from all of the previous steps have been assembled, they are presented to the cooperating agencies and release committee. If they agree that the plant is superior, the plant is cooperatively named and released for commercial production and use. The Coffeeville PMC has responsibility for maintaining breeder and foundation blocks of its releases and does not supply plant material to the general public. It only maintains small "foundation" blocks to provide genetically pure stock to qualified growers who supply the public.

MATERIALS AVAILABLE FOR COMMERCIAL INCREASE

Information about commercial production of SCS released cultivars may be obtained through any office of the SCS. Releases from the Coffeeville PMC that are available are:

'QUAIL HAVEN' RESEEDING SOYBEAN

This plant was released for wildlife in 1986. It is a vining annual legume that produces an abundance of small seed that are eaten by quail and dove. It has many hard seed that remain on the soil throughout the winter and germinate the following spring. The plants may also be used for hay and as summer cover for soil improvement.

'MEECHEE' ARROWLEAF CLOVER

This is an annual legume that is a high producer of quality forage in spring and early summer. It may also be used as a cool-season cover crop.

'CHIWAPA' JAPANESE MILLET

This plant was released for wetland wildlife by the Coffeeville PMC because of its ability to withstand flooding. It may be sowed on mud flats in the summer and flooded to provide food for waterfowl. It also produces an abundance of foliage that can be utilized by livestock.

'HALIFAX' MAIDENCANE

This grass does not produce seed so it is established from coarse rhizomes. It is an excellent plant for stabilization of stream and lake banks.

Seed of all of the above except 'Halifax' maidencane are available for certified seed production from:

Foundation Seed Stock
Mississippi State University
P. O. Box 5267
Mississippi State, MS 39762

Those interested in production of 'Halifax' maidencane or other SCS releases may also contact:

Coffeeville Plant Materials Center
Route 3, Box 215A
Coffeeville, MS 38922

FIELD ACTIVITIES IN ARKANSAS, LOUISIANA, AND MISSISSIPPI

COTTON FIELD TRIALS

In addition to no-till cotton studies at the Coffeeville PMC, field trials were also established in 1987 in Mississippi and Louisiana as field-size demonstrations. Design of the trials was left to the discretion of each state, but they agreed to work together and share information.

Conclusion of Trials in Mississippi

For the third year of the planned three-year project, NT cotton was planted at five locations in Mississippi. One cover crop (arrowleaf clover, crimson clover, hairy vetch, native cover, and wheat) was grown at each location. The objective of the project was to refine methods of reducing soil erosion by investigating the impact of reduced tillage and cover crops on cotton producing systems.

Results from the study showed that cotton could be successfully grown by the no-till method. Yields were generally similar. Sometimes one method seemed better; sometimes, the other (Table 8). Differences were often ascribed to weather, soils, and management. As with other crops and systems, experience was a key factor in determining success. Timing was important in both planting and killing the cover crop. Crops with high residues like wheat had to be killed at the proper time to eliminate possible interference at cotton planting (Table 9). Sometimes planting had to be later for no-till to allow the soil temperature to reach 65°F. The fear that insect populations would be increased with more residue did not materialize.

Table 8. Comparison of lint yield (lb/A) for no-till and conventional cotton grown with five cover crops in Mississippi, 1988-1990.

	No-Till				Conventional			
Cover Crop	1988	1989	1990	Ave.	1988	1989	1990	Ave.
Arrowleaf Clover	520	630	668	597	672	614	699	662
Crimson Clover	450	595	765	590	875	900	800	858
Hairy Vetch	717	889	794	800	750	870	757	792
Wheat	241	553	598	464	441	650	680	590
Native (Weeds)	946	1100	1125	1057	1078	882	875	945

Table 9. Canopy cover and dry matter yield for five cover crop types in NT cotton field trials in Mississippi, 1988-1989.

	Canopy Cover (%)						Dry Matter (lb/A)	
	1988			1989			1988	1989
Cover Crop	Feb.	Mar.	Apr.	Feb.	Mar.	Apr.	Apr.	Apr.
Arrowleaf clover	20	43	93	--	--	--	1150	--
Crimson clover	--	39	79	12	14	30	980	200
Hairy vetch	34	82	100	27	42	95	1300	1076
Wheat	43	52	90	81	78	98	2960	3056
Native (Weeds)	22	66	93	83	71	97	897	679

Profits from higher cotton production by conventional tillage was often negated by increased cost (Table 10). For no-till, fuel and labor expenses were reduced because fewer trips were required to prepare the field for planting. A very positive benefit from planting no-till was that soil loss was substantially reduced by approximately 64 percent.

Table 10. Estimated costs ($/A) for no-till (NT) and conventionally tilled (CT) cotton in Mississippi, 1990.

Item	C. Clover		H. Vetch		Wheat		Native	
	NT	CT	NT	CT	NT	CT	NT	CT
Defoliant	12.01	12.01	8.61	15.89	19.89	19.89	24.49	24.49
Fertilizer	40.62	40.62	64.35	62.89	46.90	46.90	57.13	57.13
Fungicides	11.31	11.31	12.27	12.27	17.06	17.06	9.05	9.05
Herbicides	39.62	29.83	55.75	30.93	62.12	47.90	42.91	30.84
Insecticides	17.76	17.76	48.64	39.61	48.65	48.65	33.22	33.22
Seed	17.79	7.44	26.90	6.20	19.52	19.52	7.44	7.44
Operator Labor	20.24	23.64	18.80	20.86	15.86	21.37	8.14	12.62
Diesel Fuel	8.44	11.29	8.77	11.60	5.58	7.94	4.08	8.84
Repair & Main.	40.58	44.26	39.57	42.73	26.00	29.50	20.43	26.31
Unalloc. Labor	16.19	18.91	15.04	16.69	12.69	17.10	6.51	10.09
Interest	12.72	12.91	18.62	17.32	15.75	15.81	14.20	14.63
Total Direct	237.28	229.98	317.32	276.99	290.02	291.65	227.60	233.66
Total Fixed	86.84	96.63	86.70	96.63	54.94	62.90	41.02	56.42
Total	324.12	326.61	404.02	373.62	344.96	354.56	268.62	290.08

WATER QUALITY IMPROVEMENT

Capitalizing on space-age technology pioneered by Dr. B. C. Wolverton at the Stennis Space Center at Bay St. Louis, Mississippi, the SCS has initiated trials to treat animal wastes using constructed wetlands in Mississippi. At the Coastal Plains Experiment Station at Newton, scientists and engineers from the SCS and Mississippi State University have constructed a series of ponds to test the effectiveness of cattail (*Typha latifolia*), bulrush (*Scirpus validus*), canna (*Canna flaccida*), maidencane (*Panicum hemitomon*), pickrelweed (*Pontederia cordata*), and arrowhead (*Sagittaria latifolia*) in treatment of wastes from a diary herd.

After being in operation one year, the plants are performing well. Data comparing effectiveness of the difference is shown in Table 11.

Table 11. Percent BOD removal over a four-week period in constructed wetland at Newton, MS (1990).

Species	July 9	July 20	July 27	Aug. 3
Arrowhead	80	94	93	83
Bulrush	77	96	87	78
Cattail	57	81	86	73
Maidencane	43	93	97	93
Pickerelweed	80	93	96	93

NATIVE VEGETATION FOR NATCHEZ TRACE PARKWAY

An interagency agreement was signed between the SCS in Mississippi and the National Park Service on August 10, 1990. The agreement was for the SCS to collect 15 species of native plants and propagate. They are to be used to vegetate slopes along sections of highway now under construction. The first sections are to be completed in 1993.

The species to be increased are:

GRASSES
- Agrostis hyemalis (Winter bentgrass)
- Schizachyrium scoparium (Little bluestem)
- Tridens flavus (Purpletop)

FORBS
- Aster cordifolius (Heartleaf aster)
- Aster sp. (Blue aster)
- Erigeron philadelphicus (Philadelphia fleabane)
- Rudbeckia amplexicalia (Clasping coneflower)
- Rudbeckia hirta (Black-eyed Susan)
- Salvia lyrata (Lyre-leafed sage)
- Sisyrhinchium angustifolium (Blue-eyed grass)

SHRUBS
- Hamamelis virginiana (Witchhazel)
- Hydrangea quercifolia (Oakleaf hydrangea)
- Rosa virginiana (Virginia rose)
- Vaccinium corymbosum (Highbush blueberry)
- Viburnum rufidulum (Rusty blackhaw)

Shrubs are to be provided as transplants. The herbacous plants are to be increased as seed. All material must be locally collected along the Trace so that no new ecotype will be introduced to the Parkway.

FIELD PLANTINGS

Field plantings are made to gather information on the performance and acceptance of PMC selections by cooperators before release. After release plantings may be made to gather more information when their range of adaptation is not clearly known.

Prior to field planting, a long range plan is prepared for the orderly testing of the promising plant. The plantings are usually scheduled over a number of years in a variety of soil and climatic conditions, if possible. Field plantings are coordinated by plant materials specialists who generally serve more than one state, and each state may test plants from several PMCs. The test sites are provided by conservation district cooperators, mining companies, local governments, and others. The plantings and evaluations are usually conducted through SCS field offices.

No PMC has presented any release candidates to test in the area so no new long range plans for field plantings were implemented in 1990. Evaluations for the few active field plantings are scheduled for completion in 1991. The data for all unreported field plantings are to be analyzed and significant results summarized in this report in 1992.

TECHNICAL PAPERS WRITTEN IN 1990

Coffeeville Plant Materials Center. Technical Notes.

No. 1. Initial Evaluation of Beaked Panicum (1984-1988).

No. 2. Initial Evaluation of Purpletop (1983-1988).

No. 3. No-Till Cotton Trials: I. Establishment Methods of Cover Crops in No-Till Cotton, 1988-1989.

No. 4. No-Till Cotton Trials: II. Effects of Cotton Herbicides on Cover Crops, 1988-1989.

No. 5. No-Till Cotton Trials: III. Effects of Cotton Cover Crops and Tillage on Cotton, 1988-1989.

No. 6. Advanced Evaluations of Giant Reed: IV. Comparison of a Coffeeville Selection with Five Accessions from Brooksville (1987-1989).

No. 7. Initial Evaluation of Rescuegrass for Winter Cover (1989-1990).

Copies of this and other reports may be obtained from:

Coffeeville Plant Materials Center
Route 3, Box 215A
Coffeeville, MS 38922

COFFEEVILLE PLANT MATERIALS CENTER

COFFEEVILLE, MISSISSIPPI

Report of Activities -- 1990

Including Field Activities in Arkansas, Louisiana, and Mississippi

STAFF

B. B. Billingsley, Jr.	Manager
Joseph A. Snider	Soil Conservationist
Luther H. Bloodworth, Jr.	Conservation Agronomist
Bill Benoist	Soil Conservation Technician
Laura Mason	Clerk-Stenographer
Jimmie Miller	Tractor Driver

PLANT MATERIALS SPECIALISTS

W. Curtis Sharp, NHQ, Washington, DC

H. Wayne Everett, SNTC, Ft. Worth, TX

James A. Wolfe, AR-MS, Jackson, MS

STATE CONSERVATIONISTS' ADVISORY COMMITTEE

L. Pete Heard, MS, Chairman

A. E. Sullivan, AR

Horace J. Austin, LA

Jerry S. Lee, TN